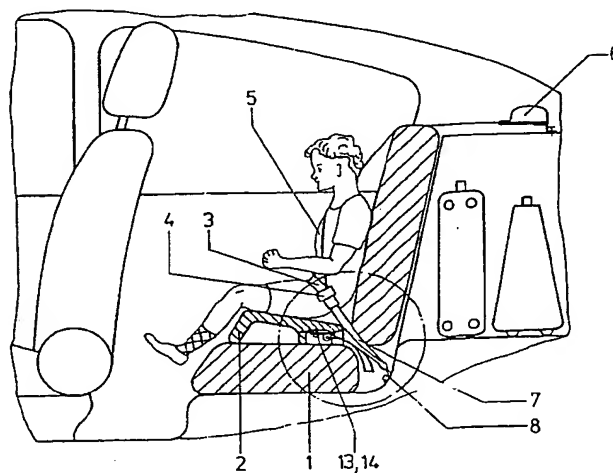


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A3V
A4J
(71) Applicants
Klippan GmbH
Sicherheitsgerate,
2 Norderstedt 3,
Kofurth 15,
West Germany.
(72) Inventors
Kurt Ulrich Muskat
(74) Agents
J.A. Kemp & Co.

(54) Kit for a safety restraining system
for use in a vehicle

(57) A kit for a safety restraining system for use in a vehicle comprises a conventional seat belt arrangement (3, 4, 5, 7) provided with fittings (6 and 8) for securement to the vehicle. The lap belt mounting fittings (8) have the lap belt portions (7) secured thereto with an extended portions of the lap belt portions extending from the fittings (8) for securement (at 13, 14) to an auxiliary safety support part (2) which is thus held in position on the vehicle seat (1) whether or not a passenger is restrained in position thereon by use of the seat belt arrangement. The system enables a child to be supported and restrained by a system primarily intended for an adult.

Fig.1



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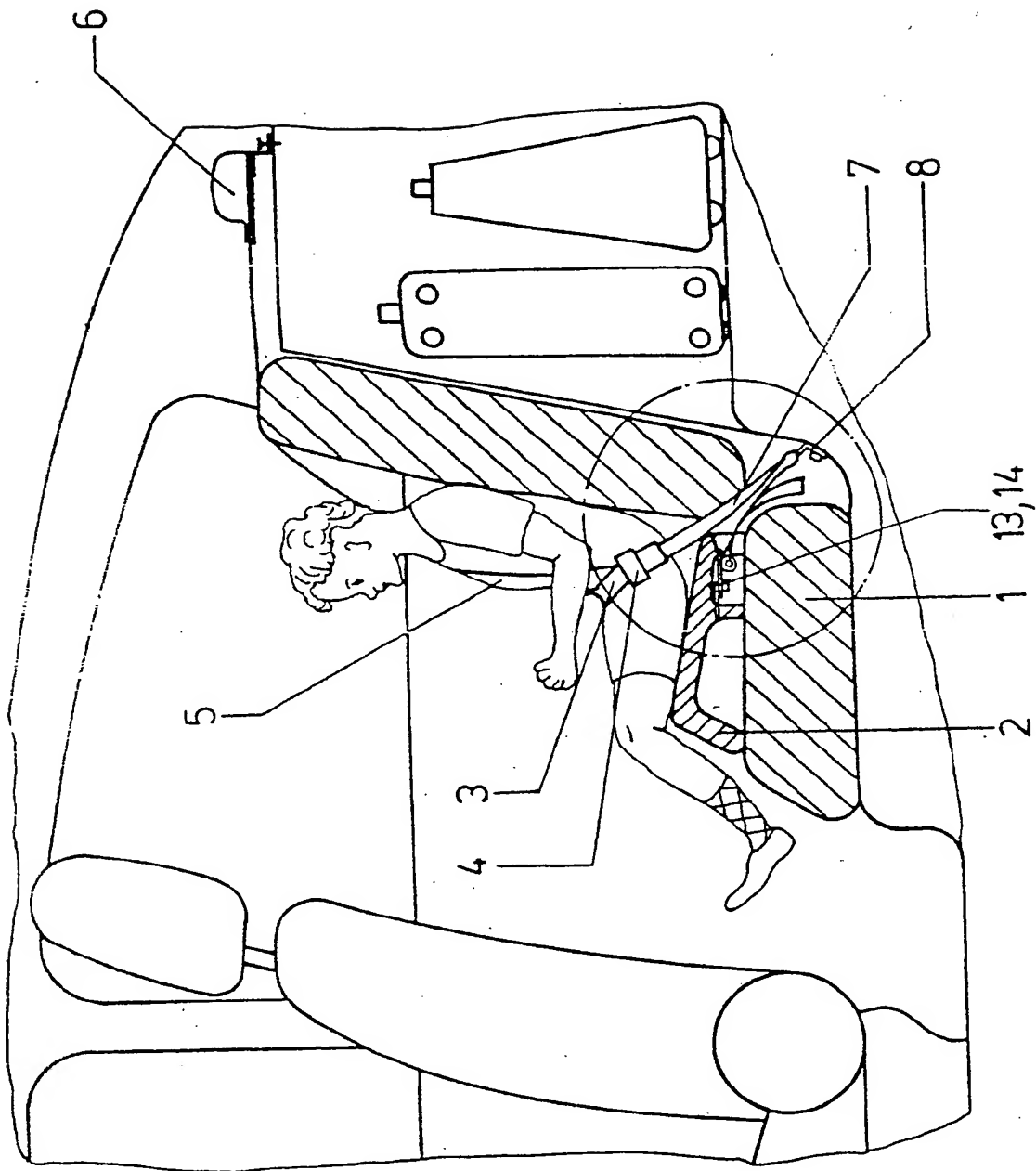


Fig. 1

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Fig. 2

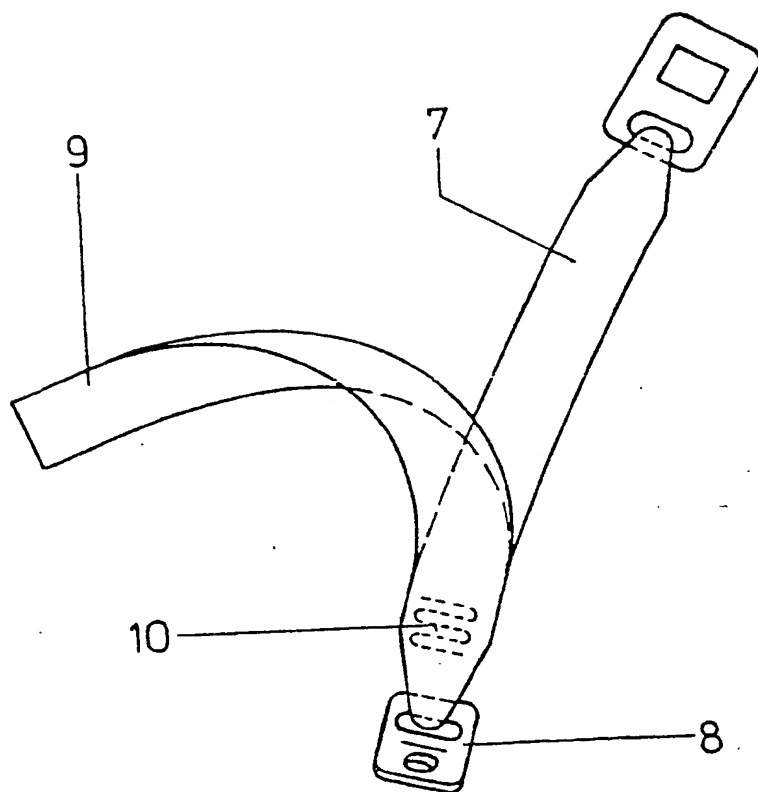
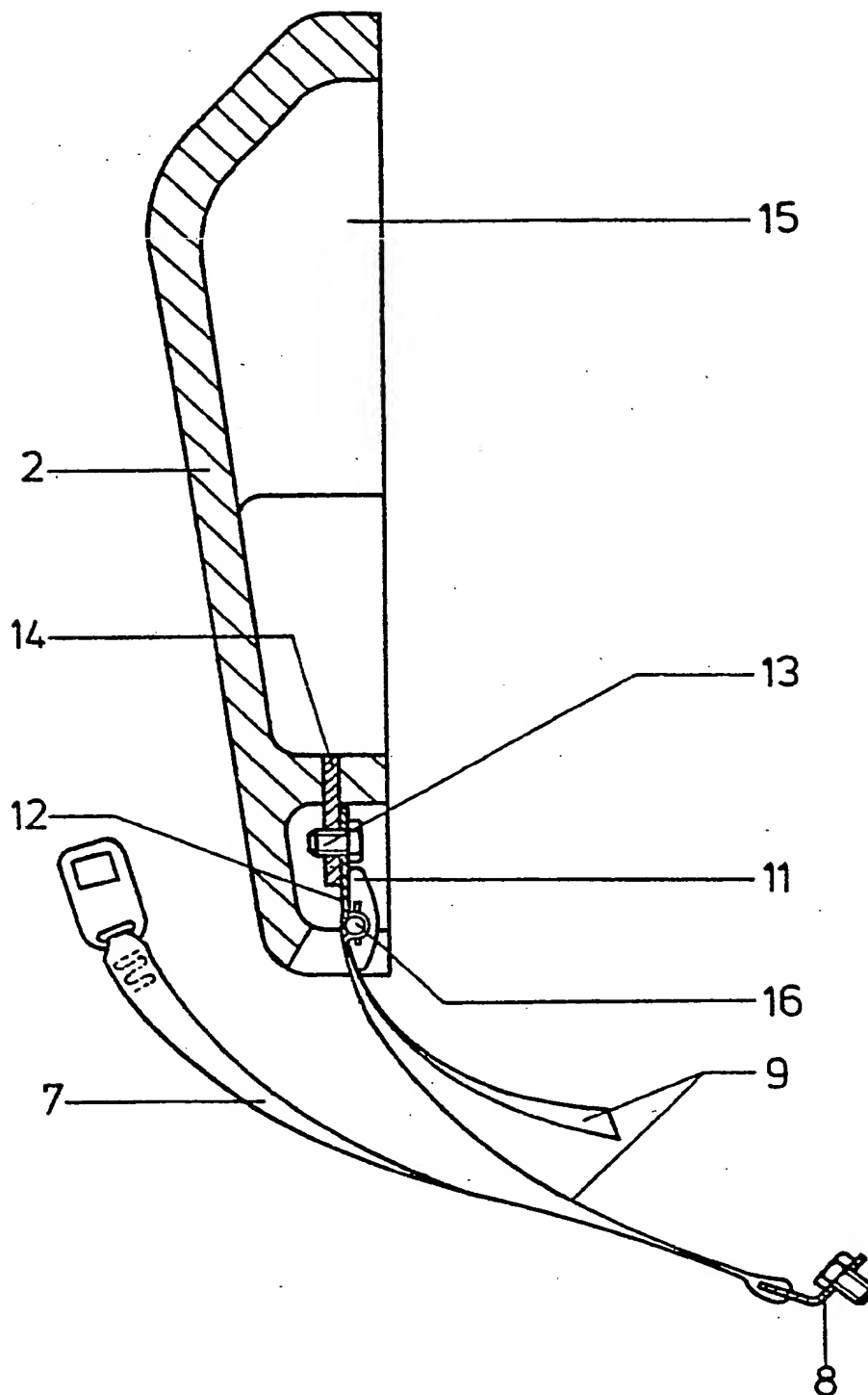


Fig. 3

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Fig. 4

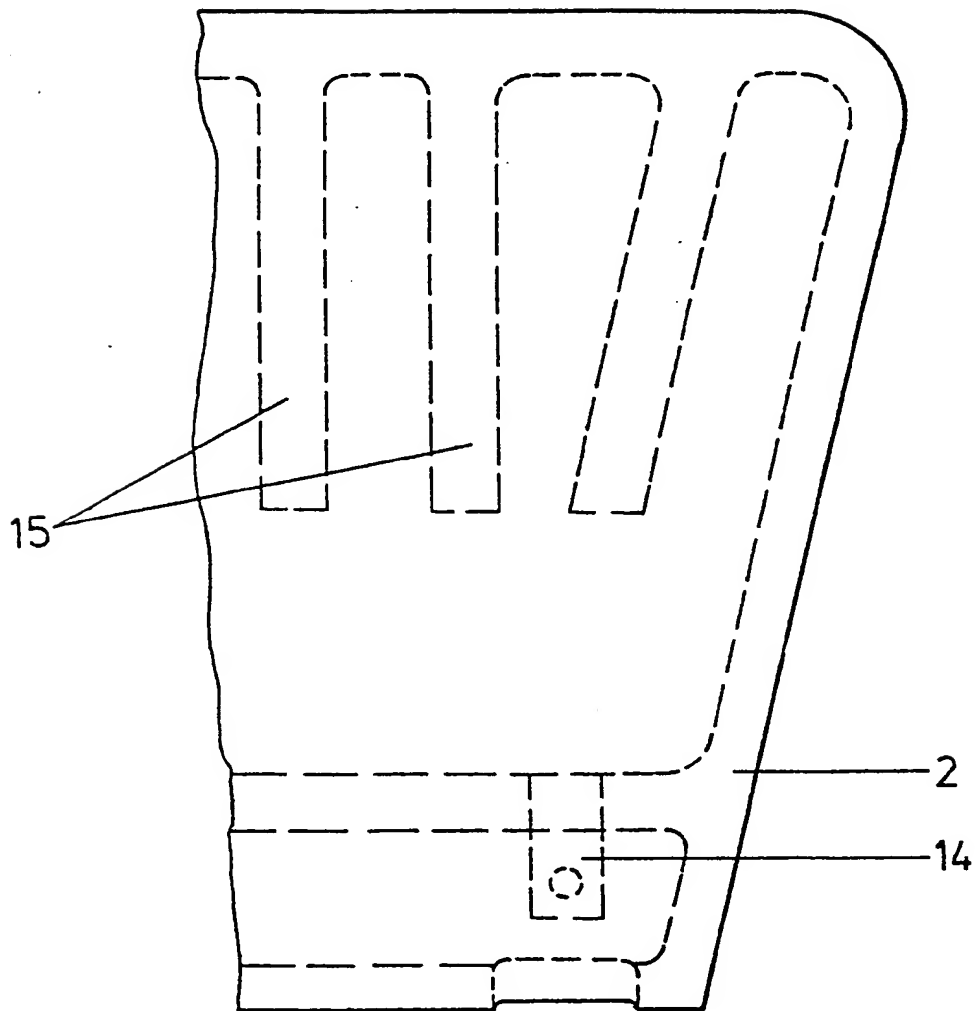


Fig. 5

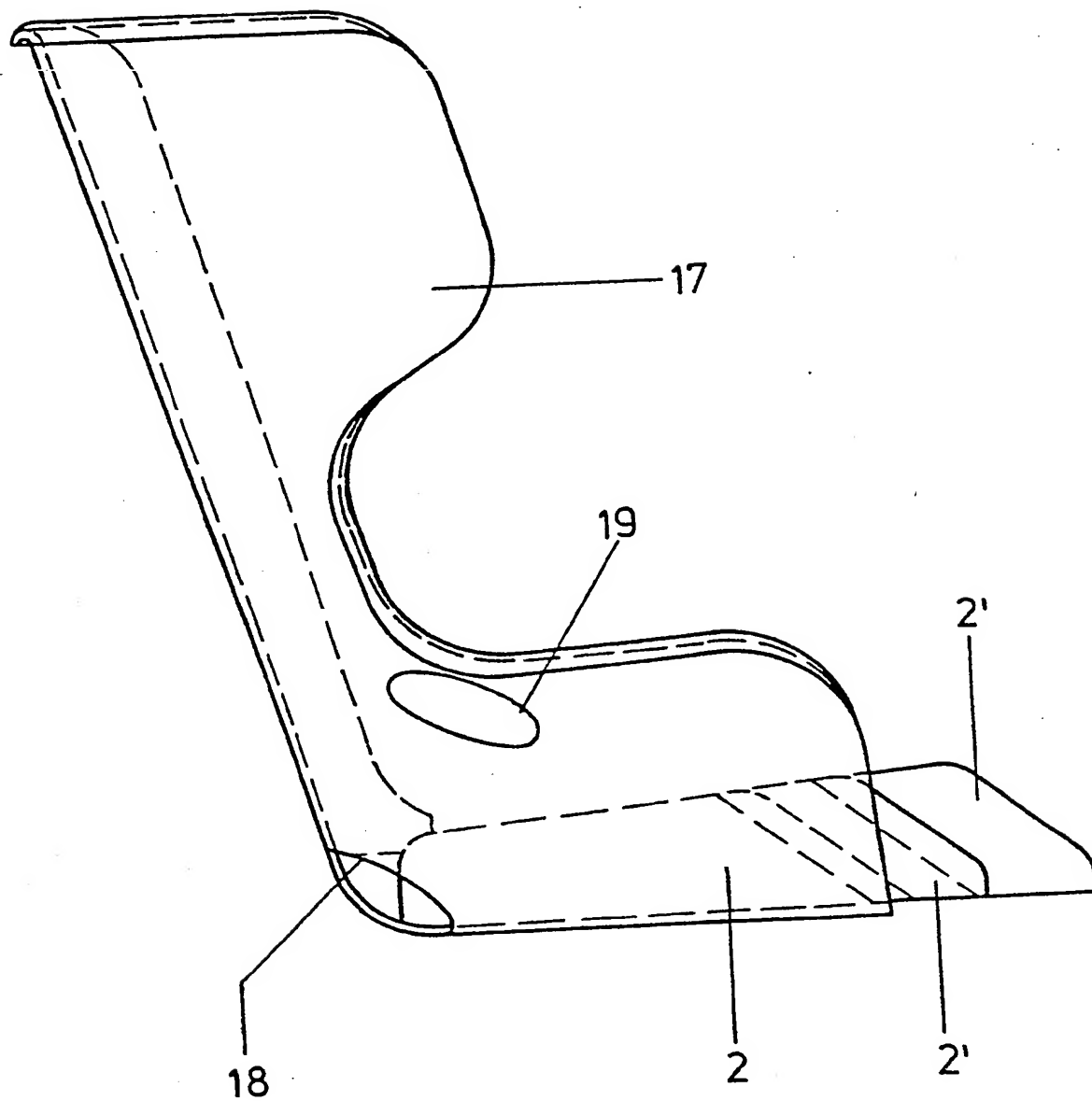


Fig.5'

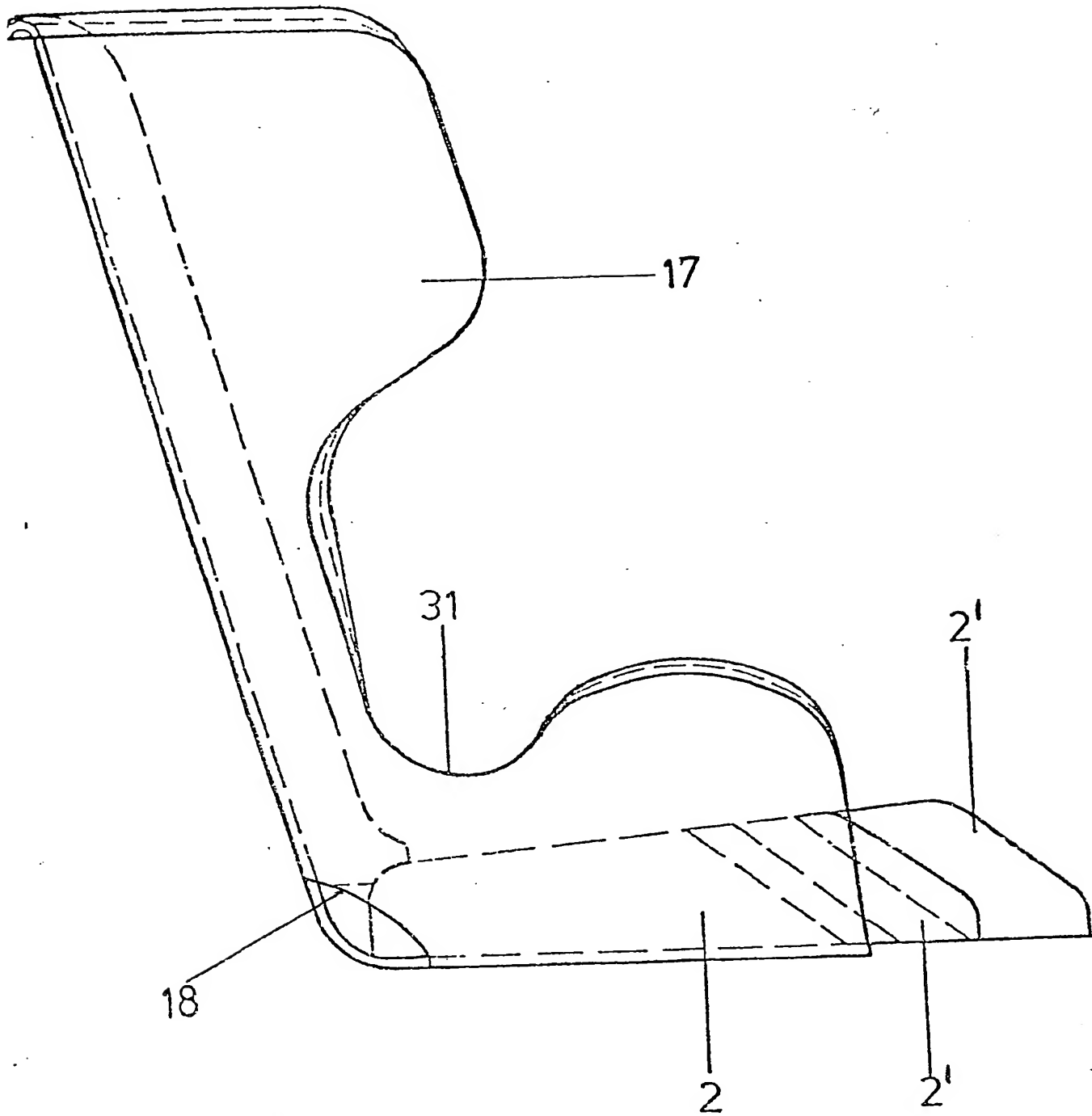
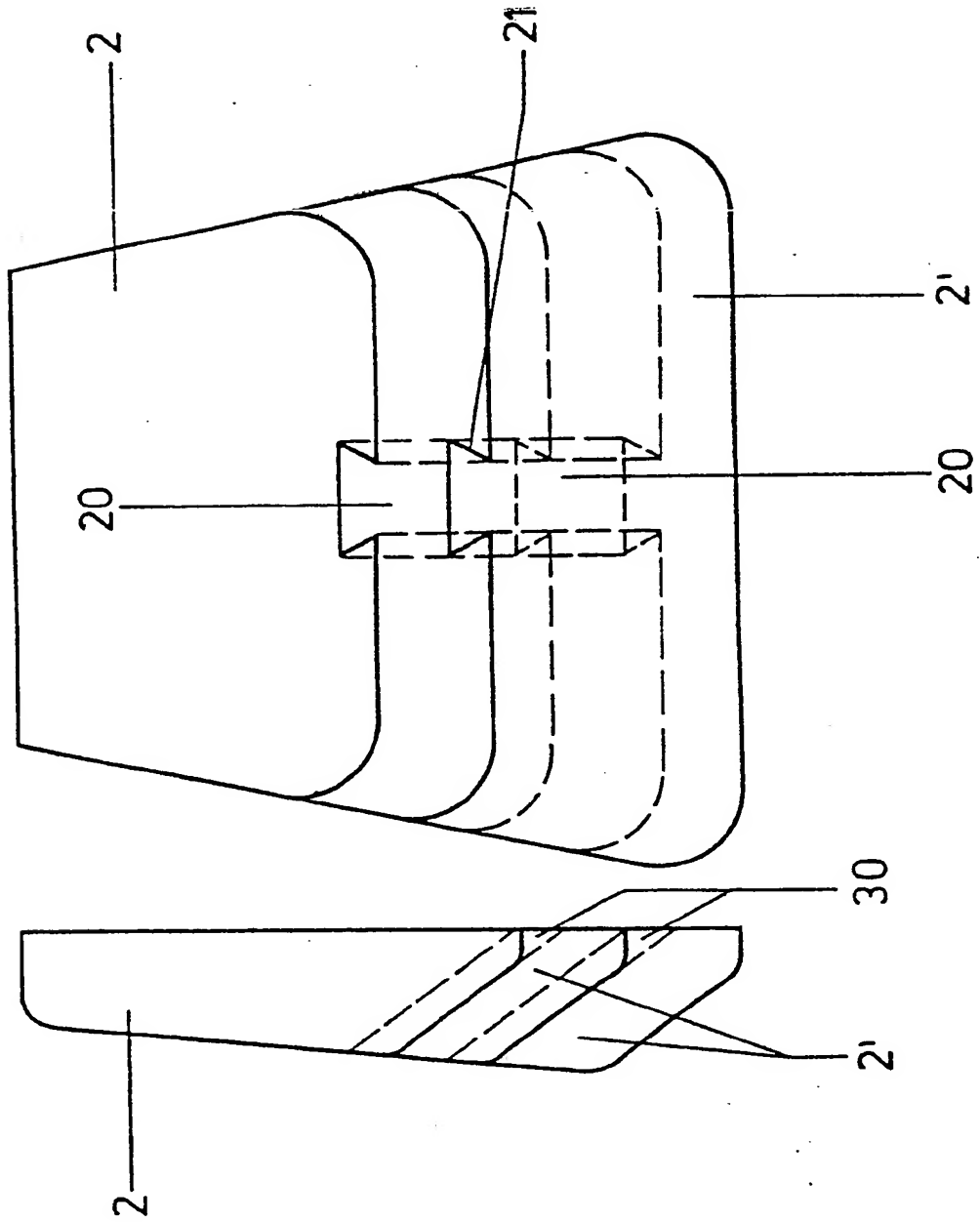


Fig. 6



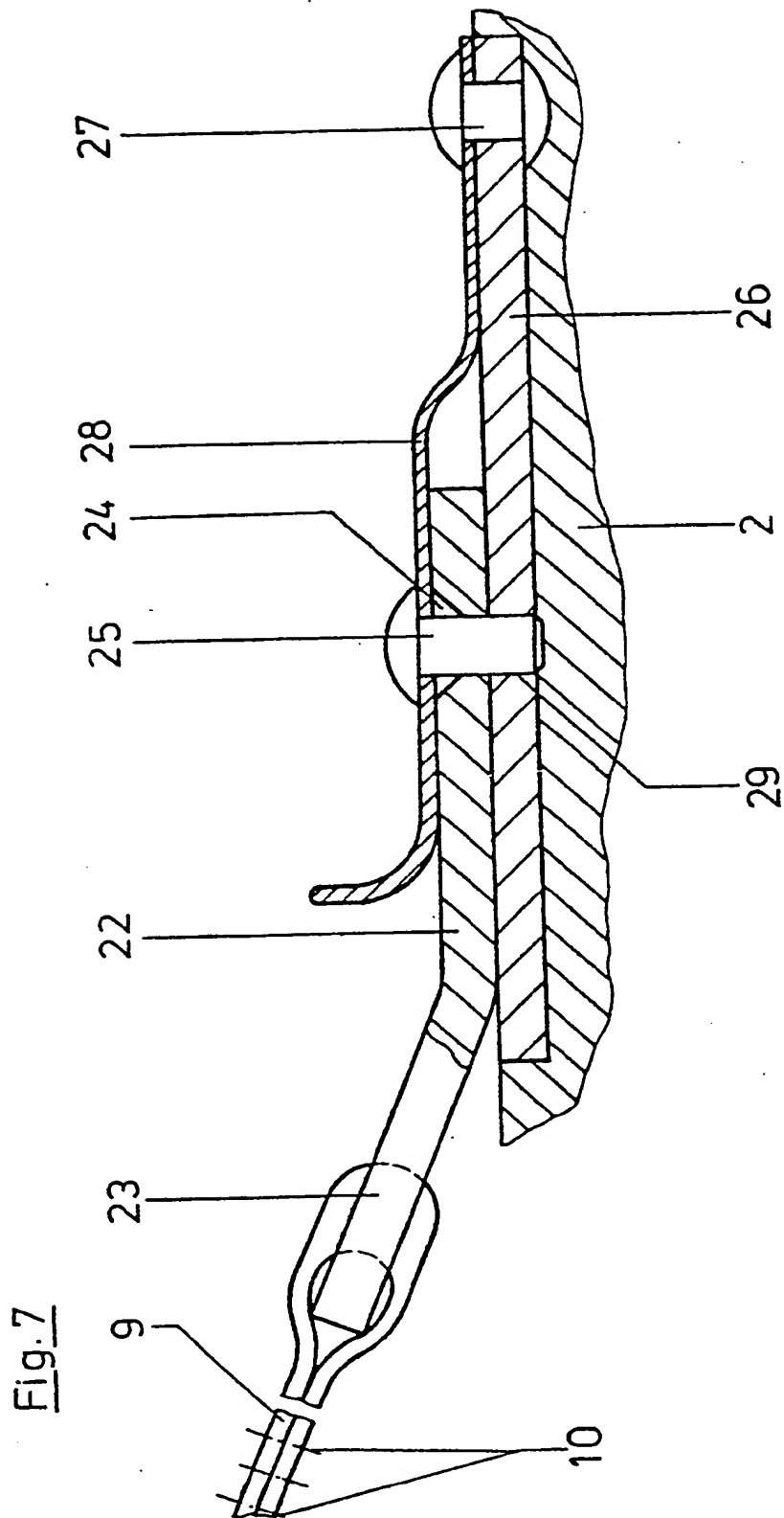
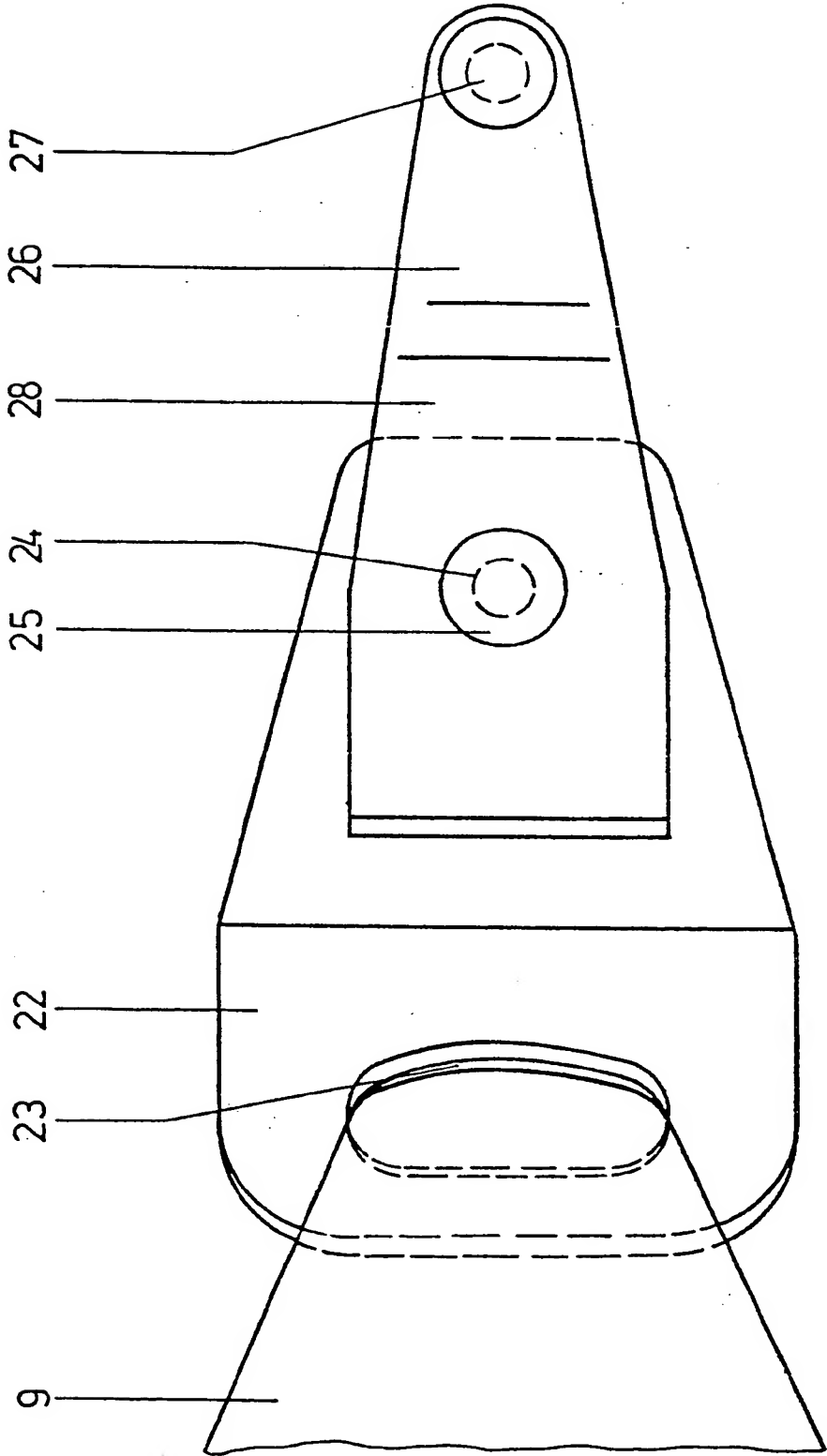


Fig. 8



SPECIFICATION

Kit for a safety restraining system for use in a vehicle

5 The invention relates to a kit for a safety restraining system for use in a motor vehicle.

Lap belt systems which are used in aircraft are known and are also used in motor vehicles, particularly on the rear seats. Above all, however, three-point belt systems are known which are used in motor vehicles, and in which the upper part of the body of the person wearing the belt is protected by a shoulder belt in addition to the protection of the hips by a lap belt. Also known are garter type belt systems and also the belt systems described in German Offenlegungsschrift 2,637,474, in which the lap belt consists of two parts and a double shoulder belt is provided, the belt webbing forming a continuous loop. This three-point safety belt is particularly suitable for the rear seats in motor vehicles. Restraining systems are known that comprise two fastening devices which are in the form of floor fittings, and floor fittings of this kind are bolted to the frame or to the floor in strong parts of the motor vehicle and consist in one frequently used form of perforated plates, which depending on space conditions are fastened in curved or straight form, rotatably, and so on. The bottom end of the lap belt is in most cases pulled through a hole in this floor fitting and stitched. As is well known, it is desirable for these floor fittings to be disposed on the floor at the side of the seat, for example in the region behind the joint between the seat cushion and the backrest, in a steep enough position to ensure that the lap belt extends at the front over the hips of the person wearing it and in the event of an accident will not allow the wearer to slip under it or "submarine".

Legal regulations for restraining systems in motor vehicles are made stricter from year to year, and in some countries there has already been some discussion of the introduction of measures making the wearing of seat belts obligatory in the back seats also and a decision to introduce some measures has been reached. As is well known, children are generally seated on the rear seats, although at the same time it is also desired to be able to carry adults in the back of a car. Consequently there is a need for a restraining system which can be used not only for small children but also for larger children, young people, and also adults, without a major mounting operation being required for the restraining system, that is to say without the floor anchorages, for example the previously mentioned floor fittings, having to be unscrewed and re-installed elsewhere or replaced by other parts.

The three-point safety belt known from the above-mentioned German Offenlegungsschrift 2,637,474 permits modifications in this respect, but it is nevertheless difficult for smaller or larger children to be strapped in comfortably and safely. From German Offenlegungsschrift 2,655,512 a seat compensating support for persons of smaller physique is known which has a triangular or trapezoidal cross-section and which is mounted on the surface of the vehicle.

seat in such a manner as to be immovable but interchangeable. This provides a seating aid, particularly for children, which not only results in greater comfort but also ensures greater ability to absorb in an expedient manner the kinetic energy occurring in the event of an accident.

The problem underlying the present invention is the provision of a kit with which a restraining system can be obtained which, without a major mounting operation, enables the final user to convert the system used by a child without difficulty for use by an adult, particularly in cases where the body shape of the wearer permits the required fastening only with certain disadvantages.

These disadvantages consist for example of uncomfortable seating when a child, whose legs are shorter than those of an adult, wishes on the one hand to have support for his back, but on the other hand wishes to be able to bend his knees and let the lower part of the legs and feet hang down. Another disadvantage consists of a restricted view of the outside. Like adults, children often wish to watch the traffic. Because a child's upper body is shorter than that of an adult, a child cannot see out of the window, so that it moves towards the front edge of the seat and is subject to great danger in the event of an accident. Another disadvantage is the poor transmission of forces at the time of an accident. The backrests of the rear seats are mostly non-adjustable and have an inclination of about 15° to 20° out of the vertical, so that if an accident occurs the passenger tends to slip under the lap belt, which in the trade is known as the "submarining" effect.

According to the invention there is provided a kit for a safety restraining system for use in a motor vehicle, such kit comprising a belt, lock, locking tongue, a safety passenger support part, and securing devices, two of the securing devices being in the form of floor fittings adapted to be mounted on the floor of the vehicle and to each of which an end of a lap belt is fastened, the belt end fastened to the floor fitting being adapted to form a belt anchorage piece extending from the floor fitting for securement to the safety passenger support part. The safety part in question, for example for small children, may be a baby basket adapted to be fastened transversely on the rear seat; it may be a bucket seat of the type which, as is well known, is not seldom used for small children and which can likewise be fastened to the rear seat; there are also combination systems comprising a seat and safety table for children, which likewise come under the definition of safety part in the sense of the invention. The seat compensating support mentioned above and similar devices also constitute a safety part in the sense of the invention. The invention is particularly described below in conjunction with the seat compensating support, because this represents a particularly preferred embodiment and enables the problems and advantages connected with the invention to be made particularly clear.

Being familiar with the behaviour of children and adults wearing safety belts, including cases where the seat compensating support is used, we have developed a simple method of better absorbing the

forces which occur at the time of an accident, that is to say of creating a safe restraining system, without requiring additional expensive parts, in order to solve the problem defined above. According to the invention it has in fact been found possible, by the simple proposal to arrange the end of the belt so that it extends as a loose length some distance from the floor fitting, to provide good anchorage means. As can be seen, this extension of the belt does not entail any additional manufacturing steps and scarcely any additional cost to the manufacturer. If the anchorage piece of the belt, which is thus provided on every floor fitting, is now used for fastening the safety part, for example the seat compensating support, various advantages will be attained: when the restraining system according to the invention is used by an adult, the safety part is removed and the belt (preferably a three-point belt) is worn in the usual way. The two belt anchorage pieces will not be a nuisance, particularly if they are clamped fast in the slit between the seat and the backrest.

In this arrangement it is particularly expedient for the end of the belt, which is passed through and stitched to the floor fitting in order to form the belt anchorage piece, to be lengthened by about 0.2 to 0.5 metre, starting from the floor fitting. So short a piece of belt is obviously not disturbing. If however, the driver should now wish to secure a child, instead of an adult, at short notice with the aid of the restraining system of the invention, he can immediately do so without a major conversion work. He can use any kind of safety part: a baby basket, a bucket seat, a seat-table combination, or a seat compensating support. This safety part, which is adapted to the physical characteristics of the passenger who is to wear the belt, is fastened in a very simple manner to the belt anchorage piece, and thus the desired safety is also achieved for the child.

The abovementioned fastening of the safety part to the belt anchorage piece can be achieved in a particularly advantageous and rapid manner if in a preferred embodiment of the invention the safety part is provided with an adjusting fitting to which the belt anchorage fitting can be fastened. Adjusting fittings of this kind are known and can be produced inexpensively as mass produced articles. The mode of operation is known to almost every motor vehicle driver, since all that is required is to insert the free end of the belt anchorage piece into the adjusting fitting on one side, bring it around a movable roller or the like, and pull it out through another opening. By pulling the belt anchorage piece tight, the safety part can be very quickly fastened to the floor fitting.

When a passenger whose body is small and whose weight is low, for example a child, comes to sit on a seat compensating support fastened on the rear seat in the manner described above, the following advantages are achieved: the child sits comfortably because it can bend its knees and has support in the hollow of the knee. The child is seated at a higher level and can watch the traffic, which has an advantageous effect on all passengers. Furthermore, because of this raised position the diagonal belt part passes advantageously and safely near the child's neck. If an accident occurs the compensating sup-

port transmits part of the energy into the seat, while another part of the kinetic energy that must be destroyed is transmitted through the belt anchorage piece to the floor fitting, the remainder of the energy that must be destroyed also passing in a desirable manner to the floor fitting via the lap belt. It can be seen that through this distribution of energy the risk of injury to the wearer of the belt in the event of an accident is considerably reduced. The submarining effect is also reduced, because the load acting on the lap belt in the event of an accident is less owing to the above described distribution of the forces acting. Consequently the elongation in the lap belt is less and the forward displacement of the chest improved. Particularly in the case of children, whose heads are heavy in proportion to the body, good forward displacement can thus be achieved, so that the head applies traction to the spinal column, whereby injuries are reduced. This forward displacement is particularly important where the rear seats are concerned, because the non-adjustable inclination of the backrest by 15 to 20° backwards from the vertical makes it particularly necessary that the passenger's hips should be moved forward less than the chest.

Through the restraining system of the invention it is possible to approximate to an optimum position of the body at the time of an accident, both in the case of a child and in that of an adult, without major conversion work in either case.

Through the fastening of the safety part, for example the seat compensating piece, by means of a separate length of belt, the load on the wearer's body at the time of an accident is reduced. With known constructions, for example when a child is strapped into a bucket seat, the belt had to hold not only the child but also the bucket seat. In contrast to the restraining system of the invention, the load on the child's body was even increased by the load of the seat.

It is very simple to bend over the end of the lap belt webbing, pull it through the floor fitting, which may be in the form of a perforated plate, to stitch it to the fitting, and simply to allow a length of belt of about 30 cm to project without disturbing this production process. Nothing is changed in the usual fastening and manufacturing process. Nevertheless, in a surprisingly simple manner a belt anchorage piece is thus made available, with which by itself all the advantages mentioned above are achieved.

In an advantageous further development of the invention a perforated plate is fastened to the belt anchorage piece and is adapted to be attached to a fitting joined to the safety part. The fitting may for example be provided with a spring rivet clip, which for the purpose of fastening is lifted off the plate by the user, against the force of the spring, the perforated plate then being inserted, while finally the rivet or pin passes, on the release of the spring, through the perforated plate and a hole in the fitting in order to ensure firm anchoring and locking. A fitting of this kind is preferably provided when the restraining system is intended for a determined type of vehicle, because it is then not necessary to adjust the length of the belt anchorage piece, for example in an adjusting fitting.

It is moreover advantageous for a plate provided with a hook on one side to be fastened to the belt anchorage piece. Just as the end of the lap belt can be fastened to the floor fitting by bending over and stitching, in this embodiment the plate is fitted to the belt anchorage piece. At the opposite end to the anchorage end the hook may for example be in the form of an end bent over in U-shape. If in addition a pulling handle is attached to the plate, hooking and unhooking can be further facilitated. A plate of this kind can be produced very simply by stamping, the hook part being stamped out of a flat plate and formed by bending over.

It is moreover expedient for the adjusting fitting to be attached with the aid of a perforated plate to a bow (plate) fastened in the safety part. Like the previously mentioned fitting, this bow can also be attached to the safety part by incorporating it by vulcanisation, particularly as the safety part is usually made of an elastic plastics material or rubber for reasons of safety. It is then particularly advantageous for the safety part to be provided with a seat compensating support and/or a bucket seat which are adapted to be jointly or separately fastened to the belt anchorage piece, and for the seat compensating support to have an undercut recess with the aid of which at least one adapter cushion, optionally provided with a similar recess can be attached. The shape and the utilisation of the seat compensating support are known and its most important features have been mentioned above. It is obvious that the compensating support must be adapted to the length of the thigh of the child or adult. With increasing age and size of the passenger the highest part of the compensating support, that is the part lying at the front in the direction of travel of the vehicle, must be moved farther forwards and upwards. For this purpose it is expedient to provide adapter cushions provided at the rear with a projection adapted to be pushed from below into a recess of complementary shape provided at the front on the seat compensating support. To achieve further extension, that is to say for further adding an additional adapter cushion, each adapter cushion may also be provided at the front with a similar bottom undercut recess, which for example may be of dovetail shape. This ensures firm anchoring of the adapter cushions to the seat compensating support. The latter in turn is fastened to the floor fitting in the manner described above.

It is also advantageous for the seat compensating support to be provided at the front end with stiffening ribs. In this way the cushion will be made harder at the front, under the hollow of the knee of the passenger, than in the region farther back. If an accident should occur the passenger is thus pushed downwards into the seat, so that a major part of the kinetic energy is transmitted into the seat by way of the compensating support and there absorbed. The adapter parts 2' described above bring about a corresponding stiffening of the wedge-shaped cushion compensating support.

Other advantages, features, and possible applications of the present invention will be seen from the following description, in conjunction with the draw-

ings, in which:

Figure 1 shows, partly in section, a child strapped on the rear seat with the aid of the seat compensating support,

Figure 2 shows a part of the lap belt and of the belt anchorage piece projecting from the floor fitting in the restraining system shown in *Figure 1*,

Figure 3 shows in section the seat compensating support and its anchoring, roughly corresponding to that part of the embodiment of *Figure 1* which is shown in the circle in dash-dot lines.

Figure 4 is a plan view of the seat compensating support viewed from above, that is to say viewing from the left in *Figure 3*,

Figures 5 and 5' show a bucket seat with compensating support and adapter cushion viewed from the side, without the belt,

Figure 6 shows on the left a side view and on the right a plan view of the seat compensating support viewed from above, the support being extended with the aid of two adapter cushions,

Figure 7 shows in section, broken away, a fitting which is fastened to a safety part, for example the seat compensating support, and to which is locked the perforated plate fastened by stitching to the belt anchorage piece, and

Figure 8 is a plan view of the arrangement shown in *Figure 7*, viewed from the left of that *Figure*.

Figure 1 shows in fragmentary, diagrammatical form the back of a motor vehicle, including the boot, rear seat, and backrest of the front seat. On the seat 1 is placed a seat compensating support 2, on which sits a child secured by means of a customary three-point safety belt comprising the lap belt 3, belt lock 4, and shoulder belt 5. At the top the shoulder belt ends at the rear on the hat shelf, on which a belt reel 6 is fastened. In the dot-dash circle in *Figure 1* lie the parts essential to the invention, of which for example the belt end 7 is shown, this end being fastened in a manner known *per se* in the bottom part of the vehicle with the aid of the floor fitting 8.

The bottom end 7 of the lap belt is passed through a hole in the floor fitting 8 in the manner illustrated in *Figure 2*, and then projects about 30 centimetres, forming the belt anchorage piece 9. Next to the floor fitting 8 the end of the belt is fastened by stitching, as shown at 10 in *Figure 2*. To the resulting belt anchorage piece 9 the seat compensating support 2 is attached with the aid of an adjusting fitting 11, which is fastened by its base 12 (*Figure 3*), with the aid of a screw bolt 13, to a fitting 14 incorporated by vulcanisation in the support 2. This arrangement is shown in detail in *Figure 3*, and partially also in *Figure 4*, corresponding to the detail shown in the dash-dot circle in *Figure 1*. In addition, it is possible to see in *Figure 3* the wedge shape of the seat compensating support, which, referring to the direction of travel, is fastened at the rear while its highest part is at the front, so that, as shown in *Figure 1*, the hollow of the knee can be supported on the higher part. Furthermore, in *Figure 4* it is possible to see the stiffening ribs 15, which ensure that in its front region the compensating support is stiffer than in its rear region. It will in addition be evident that the compensating support 2 is provided with the anchor-

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ing parts 11, 13 and 14 on both sides at the rear, although only one side is shown in the drawing, the other side being similar in appearance.

If the belt end 7 is followed in Figure 3, it will be seen that this end first extends to the floor fitting 8, is there passed through a hole, folded over, stitched as shown at 10 in Figure 2, and then extends as a belt anchorage piece 9 to the adjusting fitting 11, where it runs around the friction roller (pressure member) 16, and finally hangs free from the latter.

As shown in Figure 5, the safety part may comprise a combination of a bucket seat 17 with a seat compensating support 2, to which adapter cushions 2' are attached. The bucket seat 17 is provided at the bottom with an aperture 18, through which the belt anchorage piece 9 can be passed for the purpose of fastening the compensating support 2. Thus in the event of an accident the compensating support 2 also at the same time restrains the bucket seat 17. The passenger, who is not shown in Figure 5, is held back by the lap belt, which can be passed through the top aperture 19 in the bucket seat 17.

When a three-point belt is used, according to another embodiment (Figure 5') an optimum path can be provided for the diagonal belt part by means of a suitable cutout 31 replacing the top aperture 19.

Depending on the length of the thigh of the passenger sitting on the compensating support, the first adapter 2' or the second adapter cushion 2' can be attached. The manner in which the seat compensating support 2 is extended is illustrated in Figure 6. On the left can be seen in side view the compensating support 2 to which two adaptor cushions 2' are attached. These cushions are held by means of a dovetail guide in a correspondingly shaped dovetail recess 21 in the respective part lying behind in each case, either the support 2 or an adapter cushion 2'. Even if an accident occurs the adapter cushions 2' thus cannot slip forwards, but are held by means of this dovetail anchorage 20, 21 to the seat compensating support 2, which in turn is held by the floor fitting 8. The beads 30 shown in Figure 6 enable the adapter cushions 2' to be held in the upward direction in the adapter cushion 2' lying behind in each case or in the compensating support 2, in which the foremost part in each case is attached on the lower side.

Figures 7 and 8 show in section and plan view respectively a preferred form of construction of the fastening means, in which a perforated plate 22 is attached to the belt anchorage piece 9 by means of a hole 23 and for example stitching as shown at 10. In its upper part this perforated plate 22 has a hole 24, which serves to hold and lock it with the aid of a pin 25 attached to a spring 28 fastened by a rivet 27 to the fitting 26.

The fitting 26 is fastened in the seat compensating support 2 by vulcanisation and is also provided with a hole 29. Figures 7 and 8 show the locked position, in which the pin 25 has been inserted into the hole 24 in the perforated plate 22 and the hole 29 in the fitting 26, these holes lying in line with one another. In this position the spring 28 lies more or less flat on the outside of the perforated plate 22. If the user wishes to detach the seat compensating support 2

from the belt anchorage piece 9, he raises the spring 28, whereby the pin 25 is pulled out of the holes 24 and 29 and the perforated plate 22 can then be released from the locked position. The compensating support 2 together with the fitting 26 and the spring 28 can then be removed.

CLAIMS

1. A kit for a safety restraining system for use in a motor vehicle, such kit comprising a belt, lock, locking tongue, a safety passenger support part, and securing devices, two of the securing devices being in the form of floor fittings adapted to be mounted on the floor of the vehicle and to each of which an end of a lap belt is fastened, the belt end fastened to the floor fitting being adapted to form a belt anchorage piece extending from the floor fitting for securement to the safety passenger support part.
2. A kit according to claim 1, wherein the safety passenger support part is an auxiliary seat such that in use the components of the kit may be installed in a vehicle with the auxiliary seat being held by the belt anchorage piece in a position supported on a vehicle seat whereby a passenger on said auxiliary seat may be restrained by the belt.
3. A kit according to claim 1 or 2, wherein the belt end is passed through and secured by stitching to the floor fitting.
4. A kit according to claim 1, 2 or 3, wherein the belt anchorage piece has a length of from 0.2 to 0.5 metre from the floor fitting.
5. A kit according to claim 1, 2, 3 or 4, wherein an adjustable fitting is attached to the safety support part for adjustable receipt of the belt anchorage piece.
6. A kit according to claim 5, wherein the adjustable fitting is attached with the aid of a perforated plate to the safety part.
7. A kit according to any one of claims 1 to 4, wherein a perforated plate is fastened to the belt anchorage piece and is adapted to be attached to a fitting on the safety support part.
8. A kit according to any one of claims 1 to 4, wherein a plate provided with a hook on one side thereof is fastened to the belt anchorage piece.
9. A kit according to any one of the preceding claims, wherein the safety part comprises a set compensating support and/or a bucket seat which are adapted to be jointly or separately fastened to the belt anchorage piece.
10. A kit according to claim 9, wherein the seat compensating support has an undercut recess with the aid of which at least one adapter cushion, optionally provided with a similar recess, can be attached.
11. A kit according to claim 9 or 10, wherein the seat compensating support is provided in its front region with stiffening ribs.
12. A kit for a vehicle safety restraining system substantially as herein described with reference to and as illustrated in the accompanying drawings.
13. A vehicle having fitted therein a safety restraining system comprised by the kit of any preceding claim.